

CLAIMS

What is claimed is:

1. A cable modem system that is operable using synchronous code division multiple access for a plurality of cable modem channels, comprising:

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a plurality of cable modems;

a cable modem termination system; and

a cable modem network segment that communicatively couples the cable modem termination system to the plurality of cable modems; and

wherein the cable modem termination system is operable to provide network access to each cable modem within the plurality of cable modems, the network access being provided using a plurality of cable modem user signals, each cable modem user signal being transmitted from the cable modem termination system to at least one of the cable modems within the plurality of cable modems;

the cable modem termination system spreads each of the cable modem user signals using an orthogonal code to generate a plurality of orthogonal code spread cable modem user signals;

the cable modem termination system sums plurality of orthogonal code spread cable modem user signals together to generate a summed, orthogonal code spread signal;

the cable modem termination system spreads the summed, orthogonal code spread signal using a pseudo-noise code to generate a pseudo-noise code signal;

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the cable modem termination system provides pseudo-noise code synchronization information to at least one cable modem;

the at least one cable modem within the plurality of cable modems de-spreads the pseudo-noise code signal using the pseudo-noise code to generate a pseudo-noise de-spread cable modem user signal; and

the at least one cable modem de-spreads the pseudo-noise de-spread cable modem user
5 signal using the orthogonal code.

2. The cable modem system of claim 1, wherein the network access provided to each cable modem within the plurality of cable modems comprises Internet access.

3. The cable modem system of claim 1, further comprising a modulator,
10 communicatively coupled to the cable modem termination system, that modulates the pseudo-noise code signal; and

the modulated pseudo-noise code signal being transmitted from the cable modem
15 termination system to the at least one cable modem via the cable modem network segment.

4. The cable modem system of claim 1, wherein the cable modem termination
20 system performs transmit equalization of a communication path, between the between the cable modem termination system and the at least one cable modem, within the cable modem network segment.

5. The cable modem system of claim 4, wherein the orthogonal code spreading and
the pseudo-noise code spreading operate cooperatively to minimize effects of multi-path across
the communication path.

6. A cable modem system that is operable using synchronous code division multiple access for a plurality of cable modem channels, comprising:

a plurality of cable modems;

5 a cable modem termination system; and

a cable modem network segment that communicatively couples the cable modem termination system to the plurality of cable modems; and

wherein the cable modem termination system is operable to provide network access to each cable modem within the plurality of cable modems, the network access being provided using a plurality of cable modem user signals, each cable modem user signal being transmitted from the cable modem termination system to at least one of the cable modems within the plurality of cable modems;

at least one cable modem within the plurality of cable modems spreads at least one of the cable modem user signals using an orthogonal code to generate an orthogonal code spread cable modem user signal;

the at least one cable modem spreads the orthogonal code spread cable modem user signal using a pseudo-noise code to generate an pseudo-noise code spread cable modem user signal;

the cable modem termination system de-spreads the pseudo-noise code spread cable modem user signal using the pseudo-noise code to generate a pseudo-noise code de-spread signal; and

the cable modem termination system de-spreads the pseudo-noise code de-spread signal using the orthogonal code to generate an orthogonal code de-spread signal.

7. The cable modem system of claim 6, wherein the network access provided to each cable modem within the plurality of cable modems comprises Internet access.

8. The cable modem system of claim 6, further comprising a modulator,
communicatively coupled to the at least one cable modem, that modulates the pseudo-noise code spread cable modem user signal; and

the modulated pseudo-noise code spread cable modem user signal being transmitted from the at least one cable modem to the cable modem termination system via the cable modem network segment.

9. The cable modem system of claim 6, wherein the at least one cable modem performs transmit equalization of a communication path between the between the at least one cable modem and the cable modem termination system within the cable modem network segment.

10. The cable modem system of claim 9, wherein the orthogonal code spreading and the pseudo-noise code spreading operate cooperatively to minimize effects of multi-path across the communication path.

11. A cable modem that is operable using synchronous code division multiple access, comprising:

a transmit block comprising an orthogonal code spreader and a pseudo-noise spreader;

and

a receive block comprising a pseudo-noise de-spreader and an orthogonal code de-spreader; and

wherein the transmit block being operable to spread a cable modem user signal using the orthogonal code spreader to generate an orthogonal code spread cable modem user signal;

5 the transmit block being operable to spread a orthogonal code spread cable modem user signal using the pseudo-noise code spreader to generate an pseudo-noise code spread cable modem user signal;

the receive block being operable to de-spread a received cable modem user signal using the pseudo-noise code de-spreader to generate an orthogonal code spread de-cable modem user signal; and

the transmit block being operable to de-spread the orthogonal code spread de-cable modem user using the pseudo-noise de-spreader.

12. The cable modem of claim 11, wherein the transmit block further comprises a modulator and the receive block further comprises a de-modulator;

the modulator modulates the pseudo-noise code spread cable modem user signal before transmission to a cable modem termination system via a cable modem network segment; and

the de-modulator de-modulates the received cable modem user signal, the received cable modem user signal being received from the cable modem termination system via the cable
20 modem network segment.

13. The cable modem of claim 11, wherein the cable modem termination system is operable to provide network access to the cable modem.

14. The cable modem of claim 13, wherein the network access comprises Internet access.

5 15. The cable modem of claim 11, further comprising a front-end filter that is operable to perform ingress cancellation filtering.

10 16. A cable modem signal transmission method, comprising:
spreading an input signal using an orthogonal code thereby generating an orthogonal code spread signal;
spreading the orthogonal code spread signal using a pseudo-noise code thereby generating a pseudo-noise code spread signal;
transmitting the pseudo-noise code spread signal from a transmitter to a receiver;
de-spreading the received signal using the pseudo-noise code thereby generating a pseudo-noise code de-spread signal; and
de-spreading the pseudo-noise code de-spread signal using the orthogonal code thereby generating an orthogonal code de-spread signal.

15 17. The method of claim 16, wherein the transmitter comprises a cable modem; and
20 the receiver comprises a cable modem termination system.

18. The method of claim 17, wherein the cable modem and the cable modem termination system are communicatively coupled via a cable modem network segment.

19. The method of claim 16, wherein the transmitter comprises a cable modem termination system; and
the receiver comprises a cable modem.

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20. The method of claim 19, wherein the cable modem and the cable modem termination system are communicatively coupled via a cable modem network segment.

21. A cable modem signal transmission method, comprising:
spreading an input signal using an orthogonal code thereby generating an orthogonal code spread signal;
spreading the orthogonal code spread signal using a pseudo-noise code thereby generating a pseudo-noise code spread signal;
modulating the pseudo-noise code spread signal, for transmission via a cable modem network segment, thereby generating a modulated signal;
transmitting the modulated signal from a transmitter to a receiver via the cable modem network segment;
receiving the transmitted, modulated signal within the receiver;
performing mismatch filtering on the received signal thereby generating a filtered signal;
demodulating the filtered signal thereby generating a demodulated signal;
de-spreading the demodulated signal using the pseudo-noise code thereby generating a pseudo-noise code de-spread signal;

de-spreading the pseudo-noise code de-spread signal using the orthogonal code thereby generating an orthogonal code de-spread signal;

performing average filtering on the orthogonal code de-spread signal thereby generating an average filtered signal; and

5 performing hard limiting on the average filtered signal to make hard bit decisions.

22. The method of claim 21, wherein the transmitter comprises a cable modem; and the receiver comprises a cable modem termination system.

23. The method of claim 22, wherein the cable modem and the cable modem termination system are communicatively coupled via a cable modem network segment.

24. The method of claim 21, wherein the transmitter comprises a cable modem termination system; and

the receiver comprises a cable modem.

25. The method of claim 24, wherein the cable modem and the cable modem termination system are communicatively coupled via a cable modem network segment.

20 26. A cable modem signal transmission method, comprising:

spreading an input signal using an orthogonal code thereby generating an orthogonal code spread signal;

spreading the orthogonal code spread signal using a pseudo-noise code thereby generating a pseudo-noise code spread signal;

modulating the pseudo-noise code spread signal, for transmission via a cable modem network segment, thereby generating a modulated signal;

5 transmitting the modulated signal from a transmitter to a receiver via the cable modem network segment;

receiving the transmitted, modulated signal within the receiver;

performing ingress cancellation filtering on the received signal thereby generating a filtered signal;

demodulating the filtered signal thereby generating a demodulated signal;

de-spreading the demodulated signal using the pseudo-noise code thereby generating a pseudo-noise code de-spread signal;

de-spreading the pseudo-noise code de-spread signal using the orthogonal code thereby generating an orthogonal code de-spread signal;

performing average filtering on the orthogonal code de-spread signal thereby generating an average filtered signal; and

performing hard limiting on the average filtered signal to make hard bit decisions.

20 27. The method of claim 26, wherein the transmitter comprises a cable modem; and the receiver comprises a cable modem termination system.

28. The method of claim 27, wherein the cable modem and the cable modem termination system are communicatively coupled via a cable modem network segment.

29. The method of claim 26, wherein the transmitter comprises a cable modem termination system; and

the receiver comprises a cable modem.

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30. The method of claim 29, wherein the cable modem and the cable modem termination system are communicatively coupled via a cable modem network segment.

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